Table 6. Summary of doses (mrem/year) at ambient air monitoring stations

Station	Gross dose	Net dose	Station	Gross dose	Net dose
A3	2.8E-04	1.6E-04	A24	8.8E-05	0
A6	3.3E-04	2.1E-04	A28	3.5E-05	0
A8	2.9E-04	1.7E-04	A29	4.4E-04	3.2E-04
A9	1.4E-03	1.3E-03	A36	8.6E-04	7.4E-04
A10	1.0E-04	0	A37 (bkg)	1.2E-04	-
A12	5.7E-04	4.5E-04	A41	1.5E-03	1.4E-03
A15	1.7E-04	5.0E-05	T7	4.2E-04	3.0E-04
A23	5.2E-04	4.0E-04			

The highest net dose measured at the ambient air monitoring stations (0.0014 mrem/year) is 3.5% of the dose calculated from the combined DOE and USEC point source emissions (0.040 mrem/year). These results indicate that fugitive and point source emissions of radionuclides from the PORTS reservation do not cause a significant unmeasured dose to individuals near the site and further demonstrate that emissions of radionuclides from PORTS are within NESHAP limits.

4.4 DOSE CALCULATIONS FOR SECURITY FENCE LINE LOCATIONS

A dose calculation using the CAP88 model was also completed for locations around the perimeter of the security fence of the PORTS process area. Emissions from the DOE PORTS radionuclide sources (the X-622, X-623, and X-624 Groundwater Treatment Facilities) were used to determine the dose to a hypothetical person living at the security fence line at each of the 16 directional sectors around the plant (i.e., north, north-northeast, northeast, east-northeast, etc.). The maximum dose a person living at the PORTS security fence line would receive from DOE PORTS radionuclide emissions is 0.036 mrem/year at the south-southeast sector of the security fence line.

4.5 EMISSIONS TESTING AT THE GROUNDWATER TREATMENT FACILITIES

4.5.1 X-623 and X-624 Groundwater Treatment Facilities

Stack tests were completed at the X-623 and X-624 Groundwater Treatment Facilities during the first calendar quarter of 2001. Exhaust gas from the air strippers at these facilities was sampled during six separate tests in accordance with the applicable sections of 40 CFR Part 60, Appendix A, Method 29. Sampling was conducted during optimum operating conditions to assess worst-case emissions from the facilities.

Samples were analyzed for americium-241, neptunium-237, plutonium-238, plutonium-239/240, technetium-99, uranium-233/234, uranium-235, uranium-236, and uranium-238. All of the radionuclides were detected in at least one test except neptunium-237, which was not detected in any of the samples.

Emission rates in pCi/hour were calculated for each radionuclide for each of the six tests. For radionuclides that were not detected, half the detection limit was used to calculate the emission rate. Table 7 summarizes the maximum emission rate of each radionuclide from each groundwater treatment facility. These maximum emission rates were used to estimate the yearly emissions of each radionuclide from the facilities for inclusion in the CAP88 model (see Sect. 2.1, Table 1).

Table 7. Maximum emissions (pCi/hour) from 2001 stack testing at DOE PORTS X-623 and X-624 Groundwater Treatment Facilities

Radionuclide	X-623 Groundwater Treatment Facility	X-624 Groundwater Treatment Facility
Americium-241	3.8E+02	9.1E+02
Neptunium-237	3.7E+02	1.4E+03
Plutonium-238	2.4E+02	6.5E+02
Plutonium-239/240	2.1E+02	8.3E+02
Technetium-99	1.9E+04	4.4E+04
Uranium-233/234	5.3E+02	1.3E+03
Uranium-235	1.2E+02	4.6E+02
Uranium-236	1.6E+02	4.5E+02
Uranium-238	2.5E+02	6.5E+02

4.5.2 X-622 Groundwater Treatment Facility

Stack tests of the air stripper and clarifier at the X-622 Groundwater Treatment Facility were completed on March 26-27, 2002. Exhaust gas from the air stripper and clarifier at this facility was sampled during six separate tests (three of the air stripper and three of the clarifier) in accordance with the applicable sections of 40 CFR Part 60, Appendix A, Method 29.

Samples were analyzed for americium-241, neptunium-237, plutonium-238, plutonium-239/240, technetium-99, and total uranium. None of these radionuclides were detected in the samples, except total uranium, which was detected in the sample collected from the second test of the air stripper. According to the USEC PORTS Analytical Laboratory, which analyzed the samples collected during the stack tests, this detection should be considered a false positive based on a review of the raw sample data and the large total propagated error for the sample. As a conservative measure, however, the result for total uranium for this sample is used to calculate emissions as though uranium was detected in the sample.

Emission rates in pCi/hour (americium-241, neptunium-237, plutonium-238, plutonium-239/240, and technetium-99) and μg/hr (uranium) were calculated for each radionuclide for each test of the air stripper and clarifier. For radionuclides that were not detected, half the detection limit was used to calculate the emission rate. Table 8 summarizes the maximum emission rate of each radionuclide from the air stripper and clarifier. These maximum emission rates are used to estimate the yearly emissions of each radionuclide from the facility for inclusion in the CAP88 model (see Sect. 2.1, Table 1). Emissions of uranium isotopes reported in Table 1 were calculated by assuming that total uranium is 94% uranium-238, 5.2% uranium-235, and 0.8% uranium-234. This percentage of uranium isotopes is based upon the highest enrichment of uranium produced by DOE PORTS in recent years, which is used for commercial power reactors.

Table 8. Maximum emissions from 2002 stack testing at DOE PORTS X-622 Groundwater Treatment Facility

Radionuclide	Units	Air stripper	Clarifier
Americium-241	pCi/hr	15.7	8.0
Neptunium-237	pCi/hr	6.6	1.2
Plutonium-238	pCi/hr	6.9	2.3
Plutonium-239/240	pCi/hr	4.4	1.2
Technetium-99	pCi/hr	160.8	15.3
Uranium	μg/hr	95.3	6.4

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5. SUPPLEMENTAL INFORMATION

5.1 COMPLIANCE WITH 40 CFR 61 SUBPARTS Q AND T

Title 40, Part 61, Subpart Q of the Code of Federal Regulations addresses radon emissions from DOE facilities, and 40 CFR Part 61 Subpart T addresses radon emissions from disposal of uranium mill tailings. DOE PORTS does not have and does not expect to have any radon-220 emissions due to uranium-232 or thorium-232 sources. DOE PORTS does not manage any uranium-232 and consequently does not have any emissions of radon-220 due to uranium-232 decay. Although DOE PORTS does not specifically manage thorium-232, some amount must be present due to uranium-236 decay. Uranium-236 is itself a trace component of the uranium managed at DOE PORTS, and its thorium daughter is extremely long-lived (half-life greater than 14 billion years). These figures indicate that no measurable concentrations of radon-220 due to thorium-232 decay will exist on site within any foreseeable future.

The uranium processed at PORTS has previously been chemically purified to remove other naturally occurring elements including radium-226, which is the precursor of radon-222. It has been calculated that 10,000 years would be required before detectable levels of radon-222 would occur due to the natural decay process.

5.2 REGULATORY INSPECTIONS

No NESHAP inspections of DOE PORTS were conducted during 2003.

5.3 COMPLIANCE WITH NESHAP SUBPART H EFFLUENT MONITORING REQUIREMENTS

DOE PORTS does not operate any continuous emission monitors (samplers) on any point or stack sources within the DOE operations at PORTS. USEC operates continuous emission monitors on several of the point or stack sources within the USEC operations at PORTS.

Section 4.3 discusses the results of the DOE ambient air monitoring program. Ambient air monitoring appears to be the only feasible means for assessing emissions from fugitive and diffuse sources.

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